CPP

SETS & RELATIONS : SHEET - 2

Problems involving Operations on sets & Universal set

LEVEL-1

1. Find A – B and B – A if:
   (i) $A=\{2,3,6\}, B=\{1,3,7,10\}$ (ii) $A=\{1,4,7\}, B=[1,2,3,4,7,9\}$

2. If $A=\{4,5,8,12\}, B=\{1,4,6,9\}$ and $C=\{1,2,4,7,8,10\}$, then find :
   (i) $A-(B-A)$ (ii) $A-(C-B)$

3. If $A=\left\{x \mid x^2=4\right\}$ and $B=\left\{x \mid x^2-5x+6=0\right\}$ then $A \cup B$
   (A) {2, 3} (B) {–2, 3} (C) {2, –3} (D) {–2, 2, 3}

4. Given the sets A = {1,2,3}, B = {3,4}, C = {4,5,6}, then $A \cup (B \cap C)$ is -
   (A) {3} (B) {1,2,3,4} (C) {1,2,4,5} (D) {1,2,3,4,5,6}

5. If $N_a = \{an : n \in N\}$, then $N_6 \cap N_8 =$
   (A) N_6 (B) N_8 (C) N_{24} (D) N_{44}

6. If $A = \{ x \mid x/2 \in Z, 0 < x < 10\}$, B = {x | x is one digit prime} $C = \{ x \mid x/3 \in N, x < 12\}$,
   Then $A \cap (B \cup C)$ is equal to -
   (A) {2, 6} (B) {3, 6, 12} (C) {2, 6, 12} (D) {6, 8}

7. Let X = {1,2,3,4,5,6} be an universal set. Sets A,B,C in the universal set X be defined by A = {1,2,3},B = {2,4,5} & C = {3,4,5,6}. Then which of the following is incorrect-
   (A) A–B = {4,5} (B) (A – B) ∪ (B – A) = {1,3,4,5}
   (C) (A–B)– C = {1} (D) $A \cap C' = \{1,2\}$

8. If $X=\{4^n-3n-1 : n \in N\}$ and $Y=\{9(n-1) : n \in N\}$, then $X \cup Y$ is equal to
   (A) X (B) Y (C) N (D) None of these

9. The smallest set A such that $A \cup \{1, 2\} = \{1,2,3,5,9\}$ is
   (A) {2, 3, 5} (B){3, 5, 9} (C) {1, 2, 5, 9} (D) None of these

10. If A and B are two sets, then $A \cap (A \cup B)$ equals
    (a) A (b) B (c) ϕ (d) $A \cap B$

LEVEL-2

1. If A = {1,3,5,7,9,11,13,15,17} , B = {2,4,... , 18} and N the set of natural numbers is the universal set, then $A' \cup ((A \cup B) \cap B')$ is
   (a) ϕ (b) N (c) A (d) B

2. If X and Y are two sets and X' denotes the complement of X, then $X \cap (X \cup Y)'$ is equal to
   (a) X (b) Y (c) ϕ (d) $X \cap Y$

3. The set $(A \cup B \cup C) \cap (A \cap B' \cap C') \cap C'$ is equal to
   (a) $A \cap (B \cup C)'$ (b) $A \cap C$ (c) $B \cup C'$ (d) $A \cup C'$

4. Let X = {1, 2, 3, ..., 10} be the universal set. If A ={3, 4, 6, 8}, find A' and show that

$A \cup A' = X, A \cap A' = \phi$ and $(A')' = A$.

5. For sets $X = \{1,2,3,....,10\}$, $A = \{1,2,5,6\}$, $B = \{6,7\}$, verify that: $A - B = A \cap B' = B' - A'$

6. Prove that :
$A - (B \cup C) = (A - B) \cap (A - C)$

7. Prove that :
$A - (B \cap C) = (A - B) \cup (A - C)$

8. Prove that :
$A - (B - C) = (A - B) \cup (A \cap C)$

9. If $A \cap B = \phi$, then prove that $A \subseteq B'$ and $B \subseteq A'$

10. Match the following sets for all sets A, B and C

(i) $\left((A' \cup B') - A\right)'$	(a) A-B
(ii) $[B' \cup (B' - A)]'$	(b) A
(iii) (A-B) - (B-C)	(c) B
(iv) (A-B) $\cap$ (C-B)	(d) (A $\cap$ C) - B

ANSWERS - SHEET - 2

LEVEL-1

1: (i){2, 6}, {1, 7, 10}(ii) $(2, 3, 9)$
2: (i){4, 5, 8, 12} (ii){4, 5, 12}
3. D
4. B
5. C
6. A
7. A
8. B
9. B
10. A

LEVEL-2

1. B
2. C
3. A
10. (i) b (ii) c (iii) a (iv) d